

Application No.: 09/727,530

2

Docket No.: 509982000600

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listing, of claims in the application:

**Listing of Claims**

Claim 1 (Currently Amended): A method of creating a master library of grating profiles, the method comprising:

specifying a first parameter set including a plurality of dimensions of a grating; and  
compiling a master library of profiles using the first parameter set, the profiles including data representing combinations of grating dimensions in the specified first parameter set and corresponding calculated spectrum data;

specifying a second parameter set; and  
compiling a run-time library of profiles from the master library of profiles using the second parameter set.

Claim 2 (Currently Amended): The master library profile creation method of Claim 1, wherein the first parameter set including the plurality of dimensions of the grating comprises a minimum value, a maximum value, and a resolution for a dimension of the plurality of dimensions of the grating.

Claim 3 (Original): The master library profile creation method of Claim 2, wherein the plurality of dimensions of the grating comprises a grating top critical dimension, a grating bottom critical dimension, a grating thickness, and an underlying thickness.

Claim 4 (Original): The master library profile creation method of Claim 3, wherein the plurality of dimensions of the grating further comprises a percent height at inflection point and a grating width at inflection point.

Claim 5 (Original): The master library profile creation method of Claim 1, further comprising storing the master library of grating profiles in a storage medium.

Claim 6 (Original): The master library profile creation method of Claim 5, wherein the storage medium for the master library of grating profiles comprises a CD-ROM, a magnetic tape, a magnetic disk, and a file available for network use.

Claim 7 (Original): The master library profile creation method of Claim 6, wherein the master library of grating profiles available for network use is transmitted to clients or downloaded by clients.

Claim 8 (Original): A system for creating a master library of grating profiles comprising:  
a storage medium for storing the master library of grating profiles; and

sf-1566092

Application No.: 09/727,530

3

Docket No.: 509982000600

a computer coupled to the storage medium; and  
a compiler operable in the computer, for creating the master library of grating profiles;  
wherein the computer activates the compiler to create the master library, the compiler prompting specification of a parameter set of grating dimensions, the compiler validating the specified parameter set, the compiler creating the master library of grating profiles, based on the validated parameter set, and corresponding calculated spectrum data, and the compiler storing the master library of grating profiles in the storage medium.

Claim 9 (Original): The master library profile creation system of Claim 8, wherein the computer is a server farm.

Claim 10 (Original): The master library profile creation system of Claim 8 further comprising an input device, coupled to the computer, for entering the parameter set of grating dimensions for the master library of grating profiles.

Claim 11 (Original): The master library profile creation system of Claim 8, wherein the storage medium for storing the master library of grating profiles comprises a CD-ROM, a magnetic tape, a magnetic disk, and a file available for network use.

Claim 12 (Original): The master library profile creation system of Claim 11, wherein the file available for network use is transmitted to clients or downloaded to clients.

Claim 13 (Original): The master library profile creation system of Claim 12, wherein the file of grating profiles comprises a database of grating profiles and a run-time compiler.

Claim 14 (Original): A system for creating a run-time library of grating profiles comprising:  
a master library of grating profiles;  
a storage medium for storing the run-time library;  
a computer coupled to the master library and the storage medium; and  
a run-time compiler operable in the computer, for generating a run-time library of grating profiles;

wherein the computer activates the run-time compiler to generate the run-time library, the compiler prompting for specification of the selection parameter set, the compiler validating the specified selection parameter set, the compiler extracting the profiles from the master library of grating profiles, the compiler creating the run-time library of grating profiles, and the compiler storing the run-time library in the storage medium.

Claim 15 (Original): The run-time library creation system of Claim 14, wherein the specified selection parameter set comprises a specified minimum value, a specified maximum value, and a specified resolution value of the grating dimensions.

Claim 16 (Original): The run-time library creation system of Claim 15, wherein validation of the specified selection parameter set comprises checking that the specified minimum value and specified maximum value of the grating dimension are within the minimum value and maximum

sf-1566092

Application No.: 09/727,530

4

Docket No.: 509982000600

value of the corresponding dimension in the master library, and that the specified resolution value of the grating dimension is the same or higher than the resolution value for the master library for the corresponding dimension in the master library, and that the specified resolution value for the dimension is a multiple of the resolution value of the master library for the corresponding dimension in the master library.

Claim 17 (Original): The run-time library creation system of Claim 14 further comprising an input device, coupled to the computer, for specifying the selection parameter set for the run-time library.

Claim 18 (Original): The run-time library creation system of Claim 14, wherein the storage medium for storing the run-time library of grating profiles comprises a CD-ROM, a magnetic tape, a magnetic disk, and a file available for network use.

Claim 19 (Original): The run-time library creation system of Claim 14, wherein the run-time library comprises a database of grating profiles and a file containing a process average of each dimension of the grating.

Claim 20 (Canceled).

Claim 21 (Canceled).

Claim 22 (Canceled).

Claim 23 (Original): A method for evaluating grating spectrum data, the method of comprising:

comparing a grating spectrum data to ranges of grating calculated spectrum data in a run-time library;

flagging the grating spectrum data as falling within the calculated spectrum data ranges in the run-time library or flagging the grating spectrum data as falling outside the calculated spectrum data ranges in the run-time library; and

selecting the profile instance in the run-time library whose calculated spectrum data is closest to the grating spectrum data.

Claim 24 (Original): The grating spectrum data evaluation method of Claim 23 further comprising recording the selected the instance in the run-time library whose calculated spectrum data is closest to the grating spectrum data.

Claim 25 (Canceled).

Claim 26 (Currently Amended): A method of automatically compiling a replacement run-time library of grating profiles, the method comprising:

sf-1566092

Application No.: 09/727,530

5

Docket No.: 509982000600

specifying a set of trigger conditions that causes compilation of a replacement run-time library of grating profiles, wherein the set of trigger conditions is evaluated after a specified length of time has elapsed or after a predetermined number of gratings is manufactured; and  
compiling the new run-time library of grating profiles whenever the set of trigger conditions is met.

Claim 27 (Original): The automatic compilation of a replacement run-time library method of Claim 26, wherein the set of trigger conditions comprises one or more process averages of parameter-dimensions exceeding corresponding predetermined amounts or percentages.

Claim 28 (Canceled).

Claim 29 (Original): A system for automatically compiling a replacement run-time library of grating profiles, the system comprising:  
a master library grating profiles;  
a starting run-time library of grating profiles compiled with a starting set of trigger conditions causing compilation of a profile library;  
a replacement run-time library of grating profiles, for replacing the starting run-time library of grating profiles when compiled;  
a run-time compiler for compiling the replacement run-time library of grating profiles;  
a computer coupled to the master library and the starting run-time library; and  
a comparator operable in the computer, for calculating actual process values and comparing the calculated actual process values to the starting set of trigger conditions;  
wherein the comparator, detecting a condition where the calculated actual process values meet the requirements of the starting set of trigger conditions, invokes the run-time compiler to compile the replacement run-time library of grating profiles.

Claim 30 (Original): The automatic run-time library compilation system of Claim 29, wherein the starting set of trigger conditions is evaluated after a specified length of time has elapsed or after a predetermined number of gratings is manufactured.

Claim 31 (Original): A system for generating a library of grating profiles comprising:  
a parameter set for specifying a type of library of profiles and for specifying ranges and resolutions of dimensions of gratings;  
a computer; and  
a library generator, operable in the computer, for compiling a plurality of libraries of profiles, the profiles including data representing combinations of grating dimensions in the specified parameter set and corresponding calculated spectrum data;  
wherein the library generator creates a master library of profiles when the type of library specified by the parameter set is for the master library and creates a run-time library of profiles when the type of library specified by the parameter set is for the run-time library.

Claim 32 (Canceled).

sf-1566092

Application No.: 09/727,530

6

Docket No.: 509982000600

Claim 33 (Canceled).

Claim 34 (New): The master library profile creation method of Claim 1, further comprising: validating the second parameter set before compiling the run-time library.

Claim 35 (New): The master library profile creation method of Claim 34, wherein validating the second parameter set comprises:

checking that the second parameter set includes maximum and minimum values within maximum and minimum values of the first parameter set; and  
checking that the second parameter set includes a resolution that does not exceed a resolution of the master library.

Claim 36 (New): The master library profile creation method of Claim 35, wherein the resolution of the second parameter set is a multiple of the resolution of the master library.

Claim 37 (New): The master library profile creation method of Claim 1, further comprising: obtaining spectrum data of a grating, wherein the spectrum data was measured using an optical metrology device;  
comparing the obtained spectrum data to calculated spectrum data in the run-time library;  
flagging the obtained spectrum data as falling within or outside calculated spectrum data ranges in the run-time library; and  
selecting a profile instance in the run-time library whose calculated spectrum data is closest to the obtained spectrum data.

Claim 38 (New): The master library profile creation method of Claim 37, further comprising:  
specifying a trigger condition that causes compilation of a replacement run-time library; and  
compiling the replacement run-time library when the trigger condition is met.

Claim 39 (New): The master library profile creation method of Claim 38, wherein the trigger condition is evaluated after a specified length of time has elapsed or after a predetermined number of spectrum data have been obtained and compared to calculated spectrum data in the run-time library.

Claim 40 (New): A method of creating a library of profiles of a grating, the method comprising:  
obtaining a parameter set including a plurality of dimensions of the grating; and  
compiling a run-time library of profiles from a master library of profiles using the obtained parameter set.

Claim 41 (New): The method of claim 40, further comprising:  
verifying the obtained parameter set before compiling the run-time library of profiles.

sf-1566092

Application No.: 09/727,530

7

Docket No.: 509982000600

**Claim 42 (New):** The method of claim 41, wherein verifying the obtained parameter set comprises:

- checking that the obtained parameter set includes maximum and minimum values that do not exceed maximum and minimum values of the master library of profiles; and
- checking that the obtained parameter set includes a resolution that does not exceed a resolution of the master library of profiles.

**Claim 43 (New):** A system of creating a library of profiles of a grating, the system comprising:

- a storage medium having a master library of profiles stored therein; and
- a compiler connected to the storage medium that is configured to create a run-time library based on the master library of profiles stored in the storage medium.

**Claim 44 (New):** The system of Claim 43, further comprising:

- an input device connected to the compiler to receive a parameter set, wherein the compiler creates the run-time library based on the received parameter set.

**Claim 45 (New):** The system of Claim 43, further comprising:

- an optical metrology device configured to measure spectrum data from the grating, wherein the compiler compares the spectrum data measured by the optical metrology device to calculated spectrum data in the run-time library of profiles to determine a closest matching profile from the run-time library of profiles.

**Claim 46 (New):** A computer storage medium storing the computer readable code for causing a computer system to execute the steps of generating a library of grating profiles, the steps comprising:

- obtaining a parameter set including a plurality of dimensions of the grating; and
- compiling a run-time library of profiles from a master library of profiles using the obtained parameter set.

**Claim 47 (New):** A method of evaluating grating spectrum data, the method comprising:

- obtaining spectrum data measured from a grating using an optical metrology device;
- comparing the obtained spectrum data to calculated spectrum data in a run-time library of profiles, wherein the run-time library of profiles was compiled from a master library of profiles; and
- selecting a profile instance from the run-time library of profiles based on the comparison of the obtained spectrum data to the calculated spectrum data in the run-time library of profiles.

**Claim 48 (New):** The method of Claim 47, further comprising:

- compiling a replacement run-time library when a trigger condition is met.

sf-1566092